HISTOLOGIC RECOGNITION OF SYMPATHETIC TISSUE

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In the course of surgery of the sympathetic nervous system it is frequently of value histologically to identify tissue resected, both as a guide to the operator at the time of surgery and as a matter of record. Histologic differences exist between cerebrospinal peripheral nervous tissue and sympathetic tissue, but these are mainly differences in size of axon and degree of myelination. Sometimes the pathologist can report resected tissue only as "nerve" or "nerve ganglia." In cases where dorsal root ganglia are resected along with sympathetic ganglia, as in sympathetic denervation for angina or vascular disease of the upper extremity, it is often frankly impossible to distinguish the ganglia histologically. With this problem in mind, we have recently worked out a satisfactory method of histologic identification based on differences in the Schwann cell of sympathetic and cerebrospinal nerves.

Key and Retzius in 1873 were the first to describe the Schwann cell, although Adamkiewicz published an independent description later. The existence of these cells was at first disputed and Rosenheim, in particular, thought them mast cells. Reich studied this problem and distinguished the two cells by chemical and staining differences of the granules in the cytoplasm. He noted that the granular matter in the cytoplasm of the Schwann cells could be extracted by alcohol warmed to 45° and not by cold alcohol, and that it was various shades of red when stained with metachromatic basic aniline dyes such as polychrome methylene blue, thionine, toluidine blue, and safranine. In this manner they resembled the lipid matter of the central nervous system that Liebreich had named protagon, and so became known as protagon granules. This was later shortened to the Greek letter pi (π) by analogy to the Greek letter mu (µ) used for Elzholz bodies of peripheral nerves.

Investigation on specimens of peripheral nerves from 266 patients has shown these structures to be present in every section taken from individuals 8 years old and older, and never present below this age. Sections taken through the spinal cord in such a manner that the anterior and posterior nerve roots are present show that the granules begin to appear just distal to the glial cone where the axons become invested with neurolemma. Immediately adjacent to the glial cone, however, the Schwann cells appear to be in transition with the oligodendroglia, and protagon granules are not present. All other Schwann cells distally, however, throughout the peripheral nerve, exhibit these structures, except that the Schwann cells of the dorsal root ganglia immediately adjacent to the ganglion capsular cells, and in transition with the capsular cells, do not contain protagon granules.

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Fig. 1. Longitudinal section of a fasciculus of the sciatic nerve. The protagran granules are seen at the poles of the nuclei of several Schwann cells. Cresyl violet stain, X275.

Fig. 2. Greater splanchnic nerve at point of entrance to coeliac ganglion. A group of medullated fibers are seen to the left of the midline with one Schwann cell present containing protagran granules. Cresyl violet stain, X275.